DIURNAL VARIATION OF WIND WITH HEIGHT [IN FRANCE].[1]

By L. DUNOYER and G. REBOUL.

[*Reprinted from* Science Abstracts, Sect. A, Mar. 31, 1918, §234.]

Results of observations of pilot balloons in France, carried out at all hours of the day and night, show that at heights of from 200 m. to 800 m. the diurnal variation of wind velocity shows a pronounced maximum during the night, especially when the surface wind is light and coming from the east. The effect is masked by the influence of depressions; and it is therefore not well shown in westerly winds.—*R. C[orless]*.

PHENOMENA CONNECTED WITH TURBULENCE IN THE LOWER ATMOSPHERE.[2]

By G. I. TAYLOR.

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The power possessed by the air, in virtue of its tur bulence, of transmitting heat and momentum may be represented by the symbol K, where K is proportional to the vertical velocity in the eddies and to the scale of the turbulence. A definition of K has been given in an earlier paper (Sci. Abstr. 1915, §536), and its value was there found to be 0.3 x 10^4 in CGS units, this figure being obtained from measurements of the change of temperature with height over the sea under conditions in which the turbulence would be very small. Greater turbulence would naturally be expected over the land, and the value of K for the neighborhood of Paris is now worked out from figures which give the diurnal variation of temperature at different heights on the Eiffel Tower. The mean value for the year is found to be 10 x 10^4, very much larger than that over the sea. There appears to be no indication of an annual variation close to the ground, but K decreases with height in winter and increases with height in summer. This is ascribed to the more nearly adiabatic temperature gradient which occurs in summer—a condition favorable to the development of large values of K. The value close to the ground is nearly independent of the temperature gradient and is governed almost entirely by the wind velocity.

With a given gradient-wind the wind at levels down to the ground will be dependent on the value of K. Assuming a uniform fluctuation of K from a maximum at midday to a minimum at midnight, the form of the diurnal variation of wind velocity is calculated for different heights, and it is found that near the ground the velocity will show a maximum at midday and a minimum at night. At a certain distance up there will be two equal maxima, at midday and midnight with minima between, and at a still greater height a maximum at midnight and a minimum at midday. Some recent experiments on the diurnal variation of wind velocity at different heights by Hellmann [3] have shown that these conditions do actually exist. Further, if values of K based on the Eiffel Tower temperature observations are used reasonably, good quantitative agreement is found between the height at which the type of diurnal variation of velocity should change from one form to the other as deduced by Taylor's theory, and that at which it actually does change. This agreement provides strong confirmation for the idea that both heat and momentum are conveyed through the air by the same agency, viz, eddy conductivity.

This theory to explain the diurnal variation of wind velocity in the lower layers seems more satisfactory than that put forward some time ago by Espy and by Köppen, which fails to account for the results found by Hellmann.—*J. S. Di[nes]*.

[1] *See* Comptes Rendus, Dec. 24, 1917, 165:1068–1071.
[2] *See* Proc., Royal soc., London, Jan. 1, 1918, 94:137–155.
[3] Abstract reprinted in this REVIEW, September, 1917, 45: 454–455.

NITROGEN, CHLORINE, AND SULPHATES IN RAIN AND SNOW.[1]

By E. L. PECK.

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Continuing the observations by Artis at Cornell College, the author deals with 33 precipitations (15.86 inches) of rain and 8 precipitations (22 inches) of snow (equivalent to 17 inches of rain) in the period October 20, 1916, to June 8, 1917. The substances determined are—

	Parts per million per precipitation.
Sulphate	4.0 to 37.0
Nitrate	0.1 to 0.35
Nitrite	0.0005 to 0.2
Nitrogen, in free ammonia	0.87
Nitrogen, albuminoid ammonia	0.388
Chlorine	2.84 to 18.62

The chlorine content was the most constant, being 7.1 parts for 20 cases.—*H. B[orns]*.

ACOUSTICS OF THE ATMOSPHERE.[2]

By E. SCHRÖDINGER.

[*Reprinted from* Science Abstracts, Sect. A, Feb. 28, 1918, § 181.]

A mathematical treatment of sound propagation in an ideal atmosphere. Plane waves are first considered proceeding vertically, in an isothermal and still atmosphere, with the usual barometric formula. It is thus shown that the amplitude varies inversely as the square root of the density. General wave motion is then dealt with, and it is here shown that the decrease of density above is exactly compensated by increase of amplitude, so that the radiation of energy proceeds as in a homogeneous medium. The influences of temperature gradient and chemical composition are next considered. Finally the attenuation of the sound due to viscosity is treated, the results being shown by graphs. (See Abstract 458 of 1916)—*E. H. B[arton]*.

MEASUREMENTS OF ATMOSPHERIC ELECTRICITY ON TENERIFFE.[3]

By W. BUCHHEIM and H. DEMBER.

[*Reprinted from* Science Abstracts, Sect. A, Feb. 28, 1918, § 189.]

Positive ionization in the air over the Peak of Teneriffe shows a maximum two to three hours after midday. This result is independent of the relative humidity, and it is therefore presumed that ultra-violet light or some other ionizing agent is the cause of the ionization.

The dry gases issuing from blowholes of the crater on the peak are found to possess an ionic density which is ten times that of the free air in the neighborhood. (See Abstract 1075 of 1912.)—*R. C(orless)*.

[1] *See* Chem. News, Dec. 14, 1917, 116: 283–284.
[2] *See* Physikal. Ztschr., Oct. 1, 1917, 18: 445–453.
[3] *See* K. Sächs. Gesell. Wiss., Leipzig, Dec. 1915, 67; *also extract* Ann. d. Physik, Oct. 26, 1917, 53, 10: 138–150.